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E05B 47/00 65/36

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U1S S1820 S1855

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US 4978154 A

(58) Field of Search
UK CL (Edition M) E2A AMXF
INT CL[5] E05B 47/00 65/36

(54) Vehicle door locking device with an antitheft mechanism

(57) A vehicle door locking device comprises a main locking lever 11 connected to a key cylinder which acts to allow or prevent lock release, and a sub locking lever 26 linked to an inside door lock button 36. A connector 58, always linked to the main lever 11 and normally linked to the sub lever 26 (fig 1), can be moved to an antitheft position (fig 18) in which sub lever movement is not transmitted to the main lever 11. A motor driven member 48 can act to move the main lever 11 and, with the main lever in the locked position, to move link 58 to the antitheft position. A guide wall 67 acts to displace the connector from the antitheft position when the connector 58 is moved as a result of unlocking movement of the main lever 11.

FIG. 1

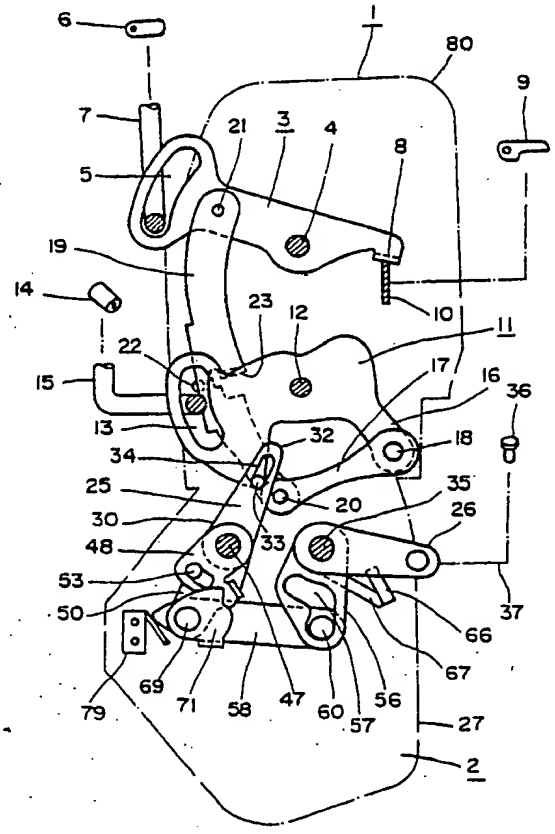

FIG. 18

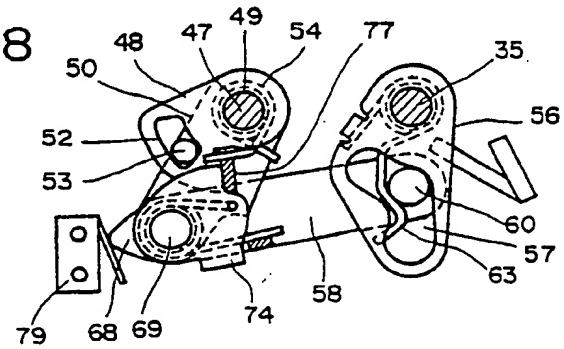

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FIG. 1

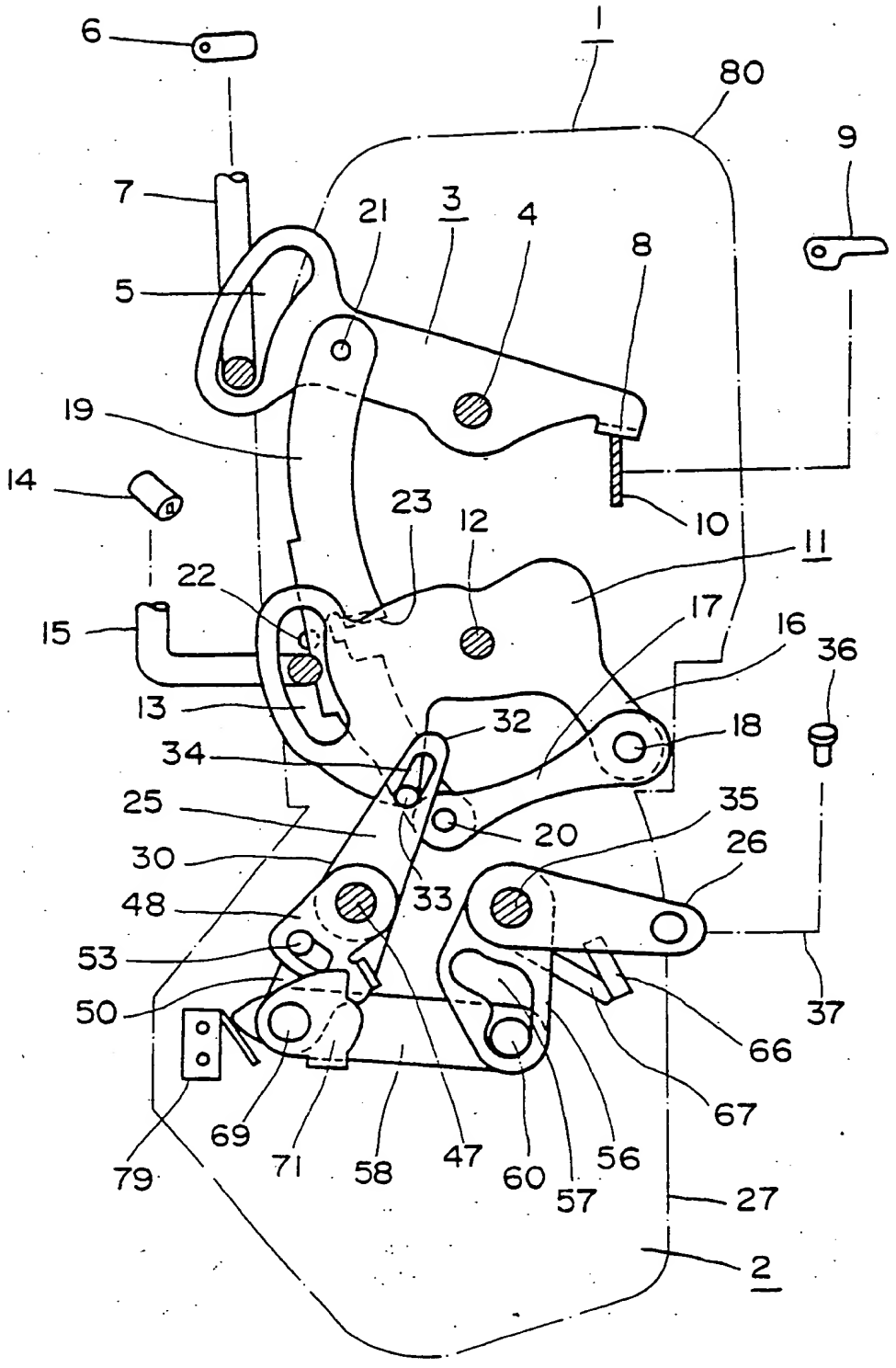
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FIG. 2

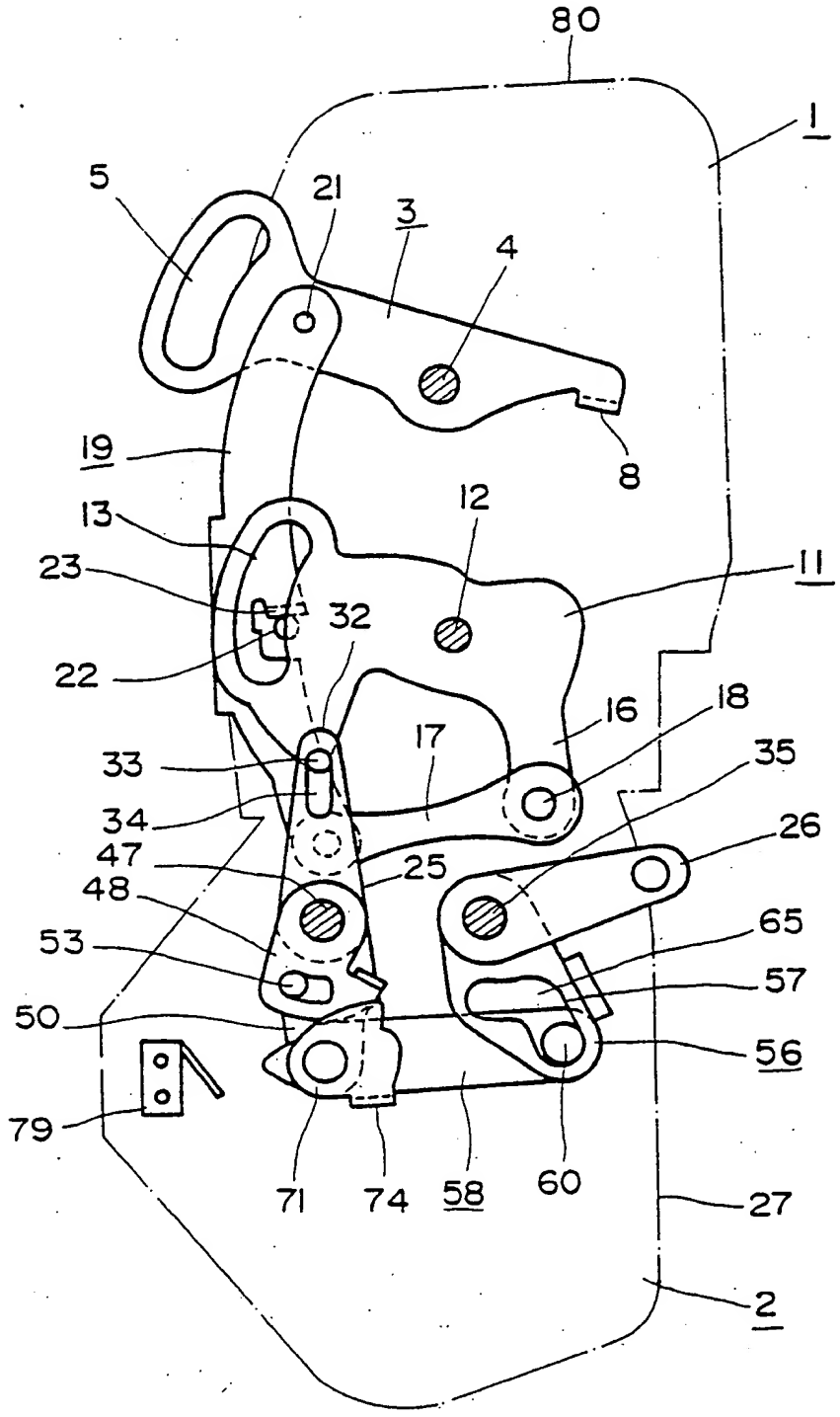
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FIG. 3

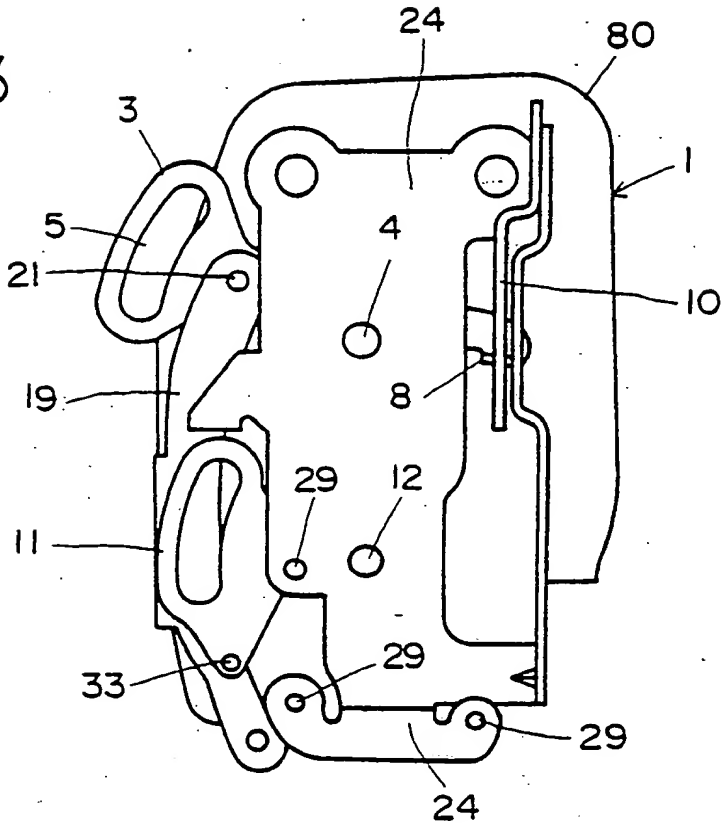
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FIG. 4

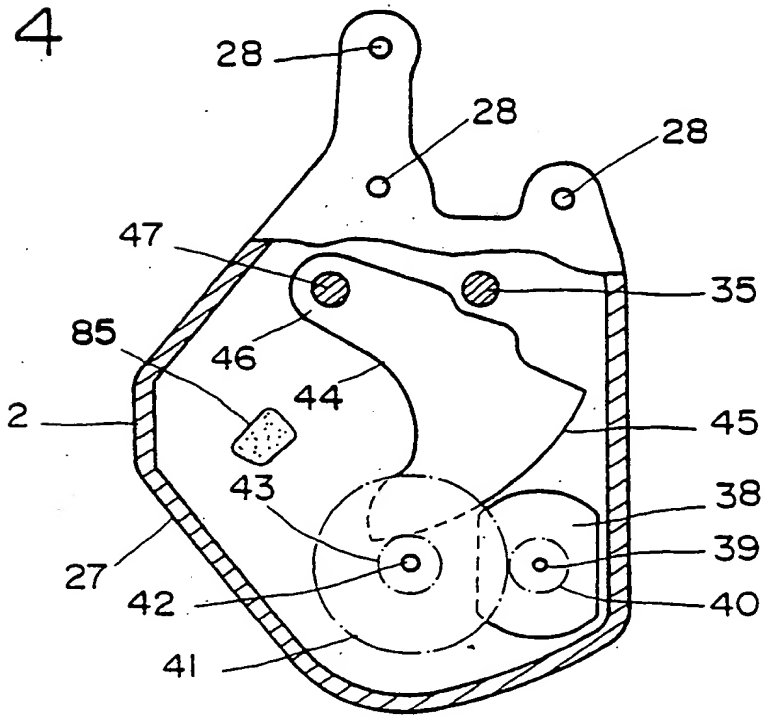
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FIG. 5

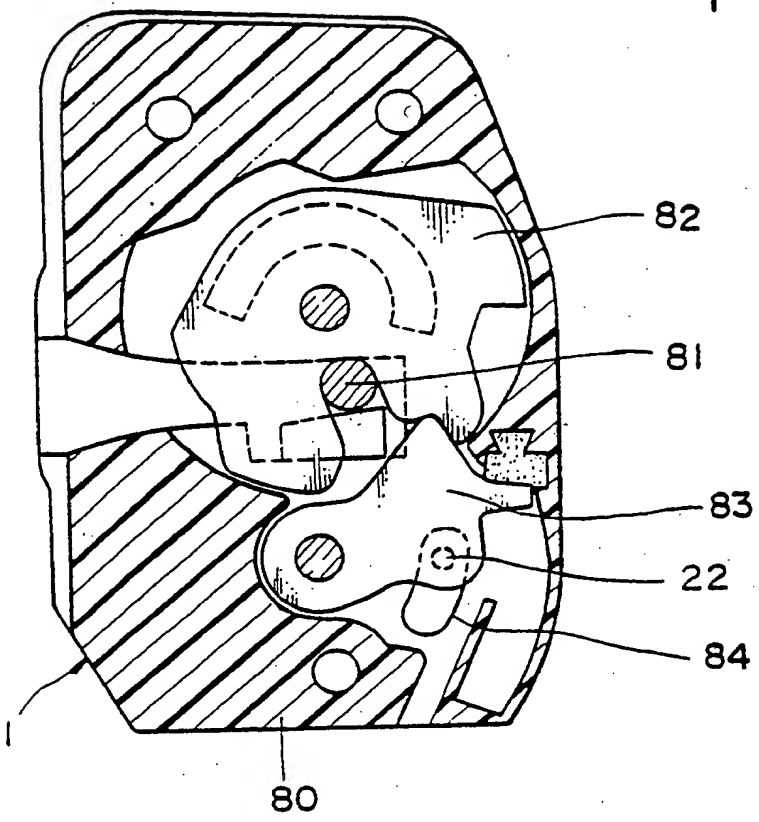


FIG. 7

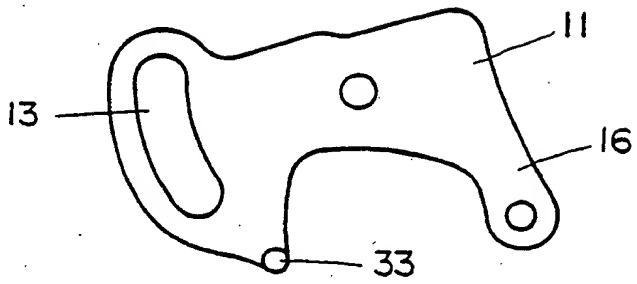


FIG. 6

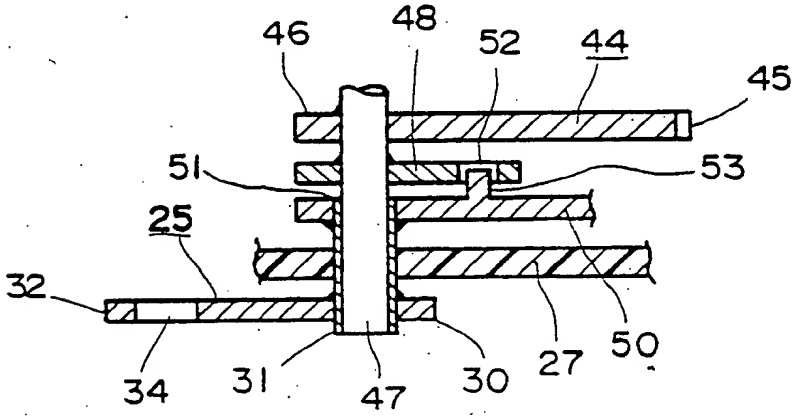


FIG. 8

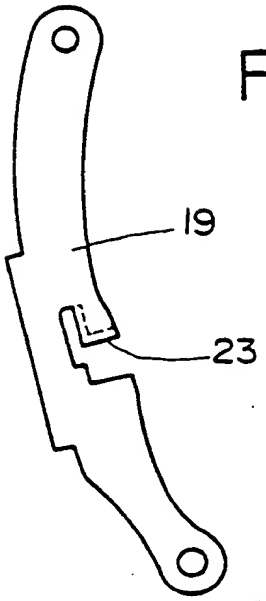


FIG. 9

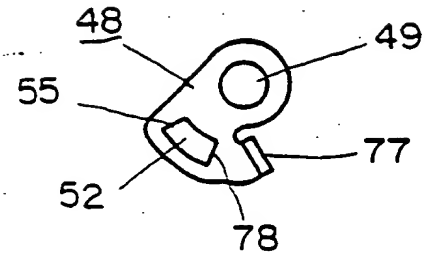


FIG. 10

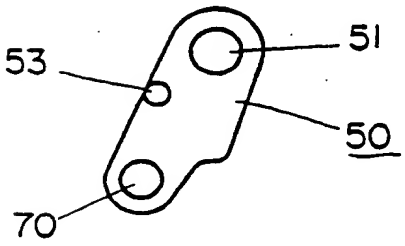


FIG. 11

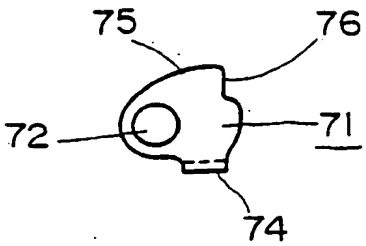


FIG. 13

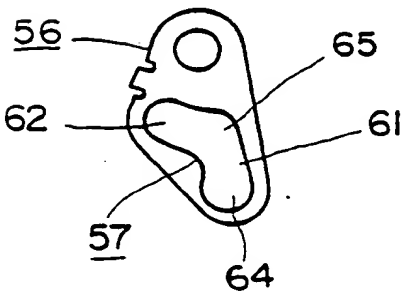


FIG. 12

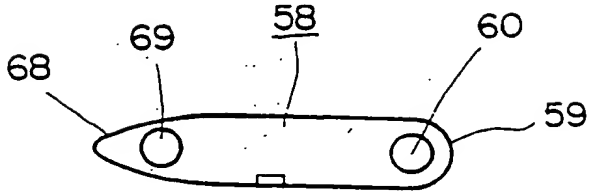


FIG. 8

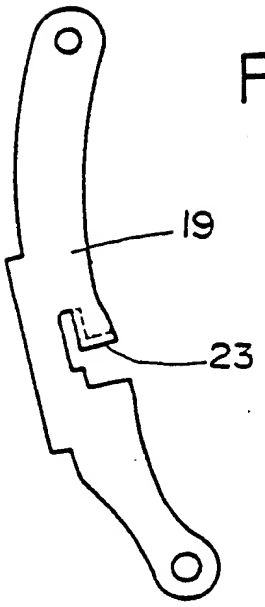


FIG. 9

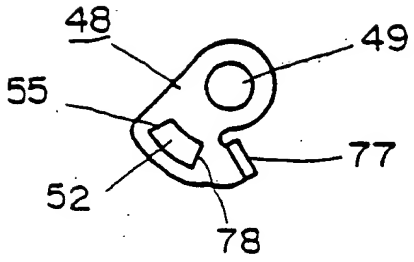


FIG. 10

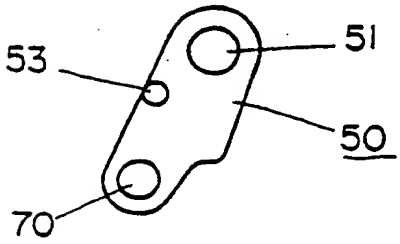


FIG. 11

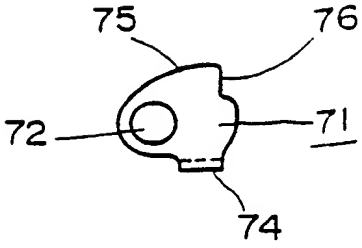


FIG. 13

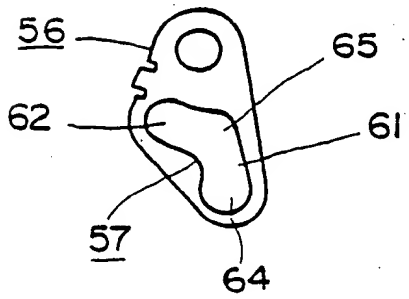


FIG. 12

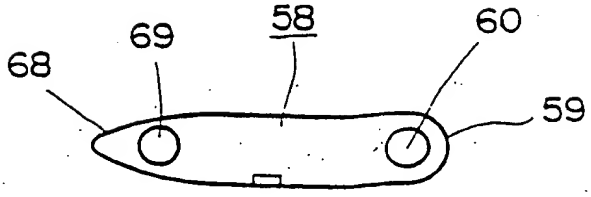


FIG. 14

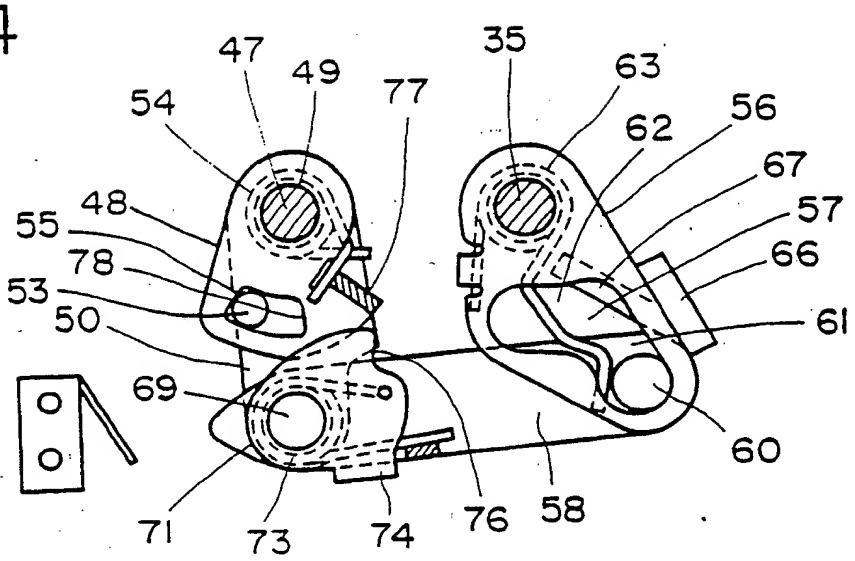


FIG. 15

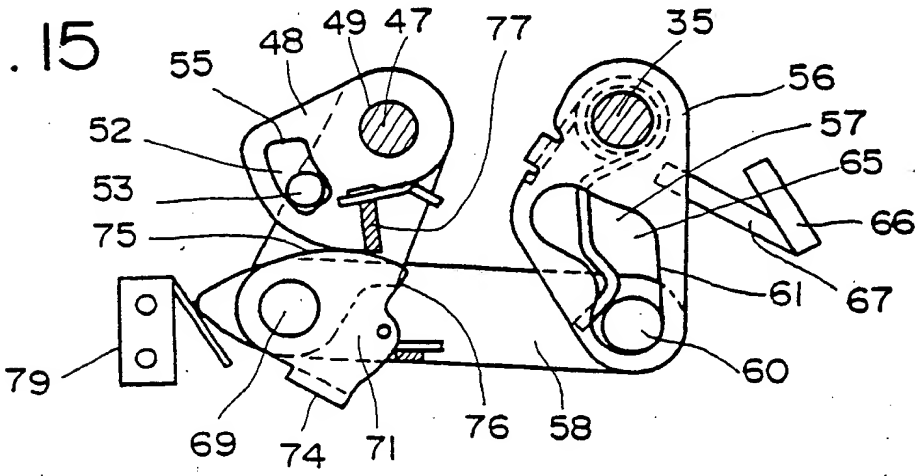


FIG. 16

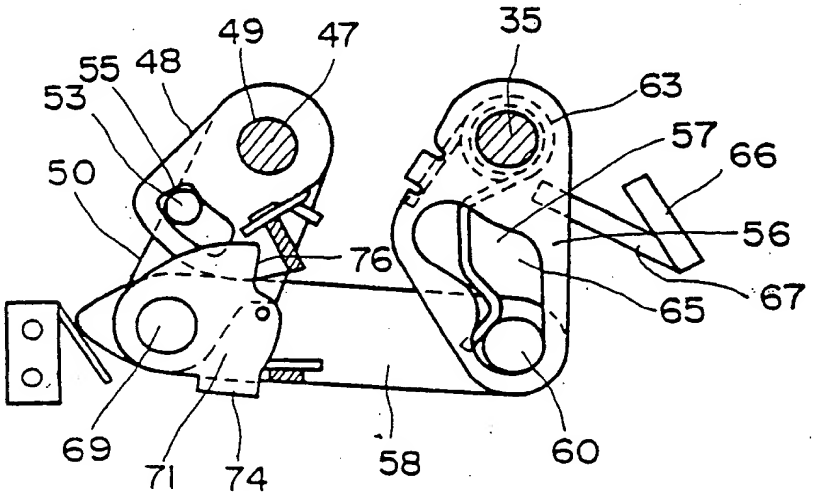


FIG.17

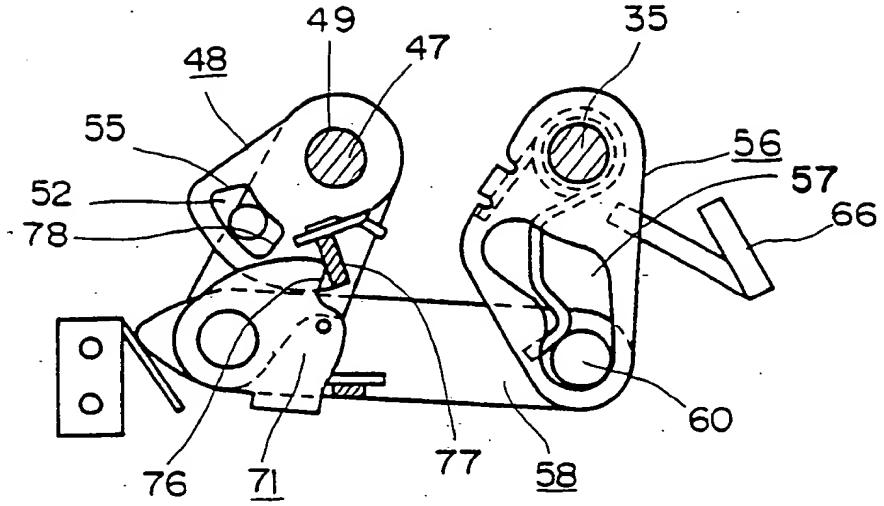


FIG.18

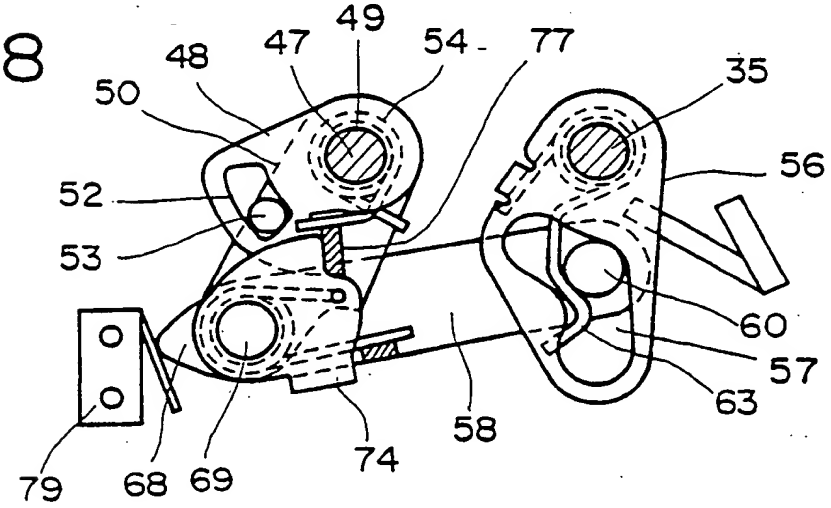


FIG.19

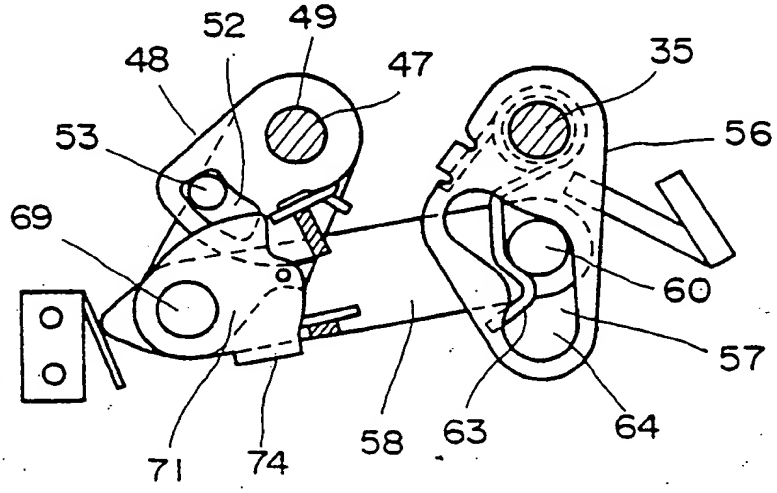


FIG. 20

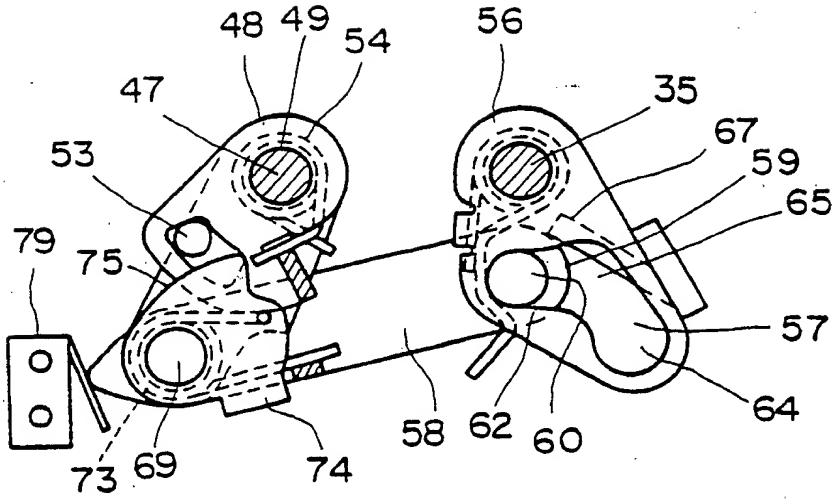


FIG. 21

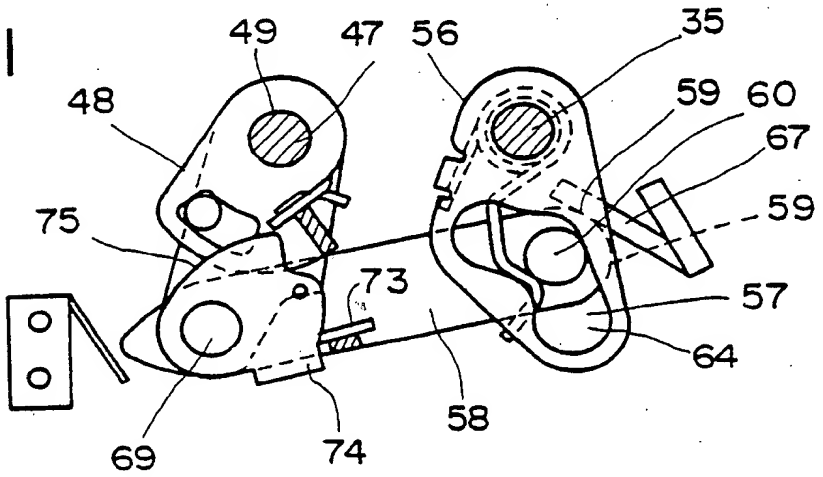


FIG. 22

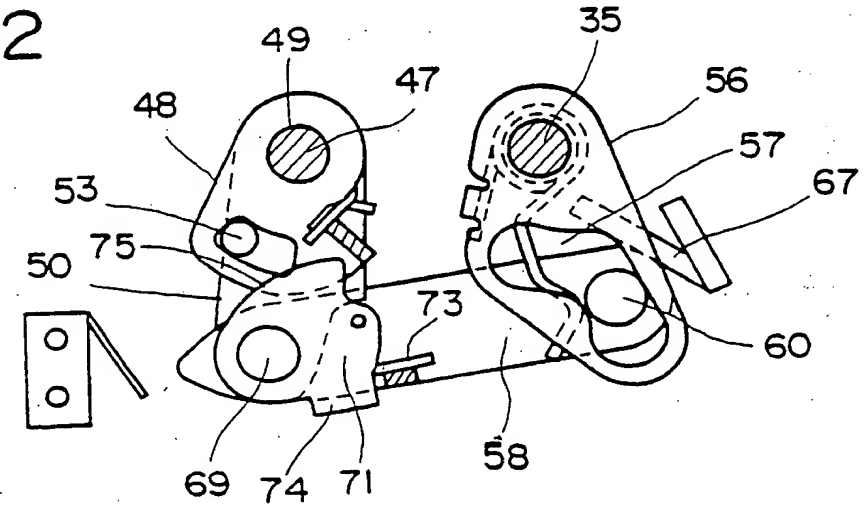
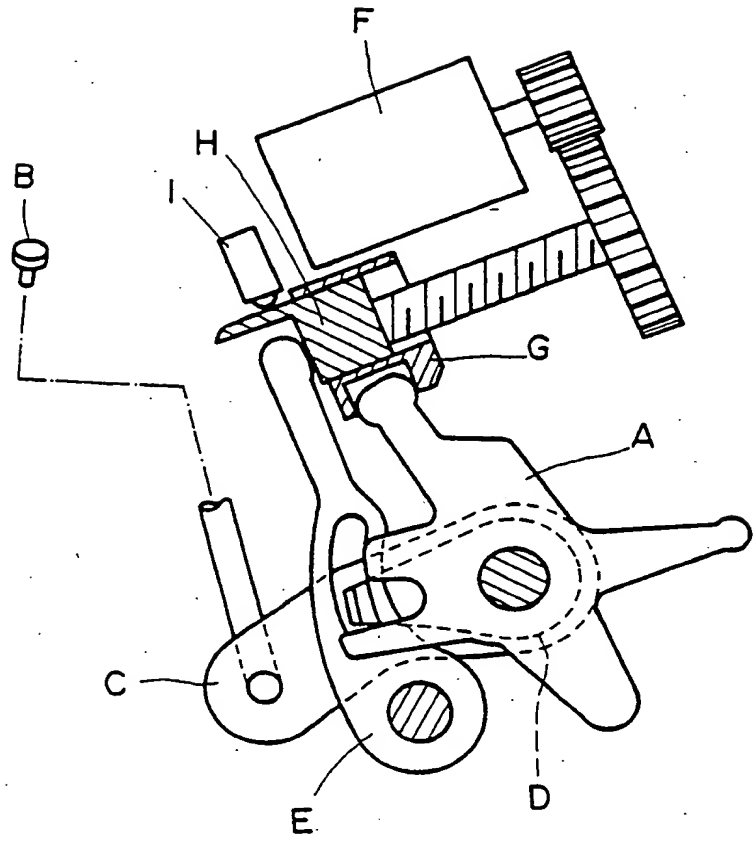


FIG. 23

(PRIOR ART)



DOOR LOCKING DEVICE WITH AN ANTITHEFT MECHANISM

The present invention relates to a door locking device, and more particularly relates to a door locking device with an antitheft mechanism.

According to a door locking device of an already known prior art, a door is locked and unlocked by a key cylinder attached outside the door or a lock button inside the door. In order to cancel the locking state of a locking device from outside the vehicle body, a key corresponding to the key cylinder is usually needed. However, a thief may cancel the locking state by directly operating the inside lock button by breaking a window.

In order to cope with such an unjust operation, United States Patent No. 4,978,154 which is already known to the public proposed a locking device having an antitheft mechanism which can stop the function of the inside lock buttons. As shown in Fig. 23, the locking device is provided with a main lock lever A linked with the key cylinders of doors, which can change over the locking device to the locking state and unlocking state; a sub locking lever C linked with the inside lock button B of the doors; a connector D which is changed over to the antitheft position in which the rotation of the sub lock lever C installed

FIG. 20

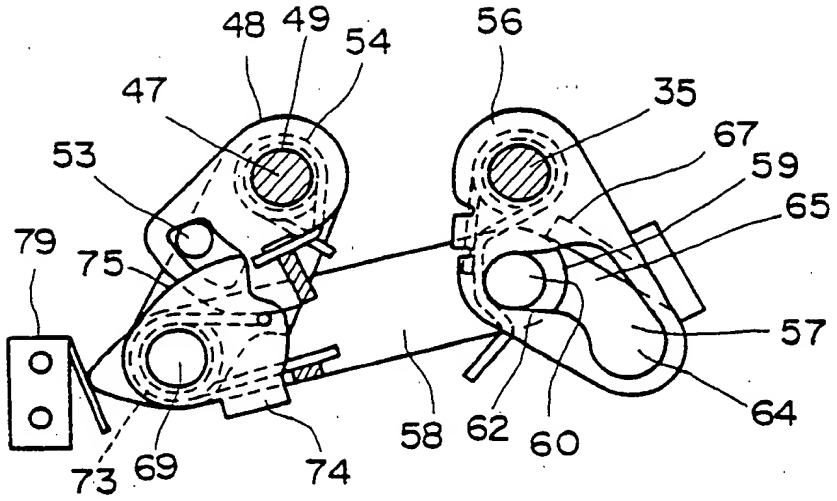


FIG. 21

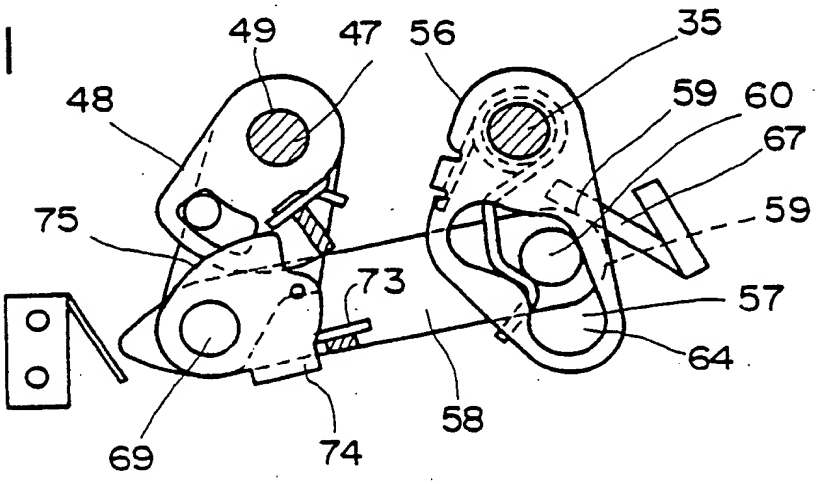
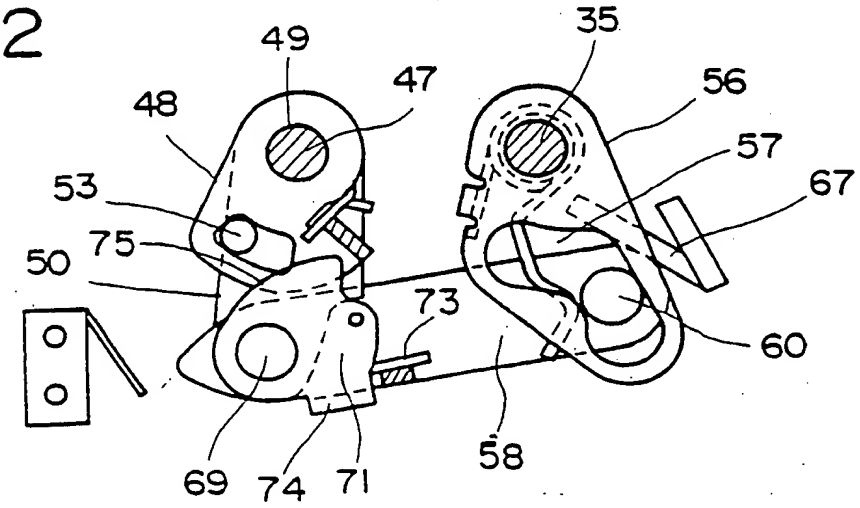


FIG. 22



between the main lock lever A and the sub lock lever C is not transmitted to the main lock lever A, and the normal position where both the lock levers are connected; a change lever E which changes over the connector D; an output member G which is displaced by a motor F and is linked with the main lock lever A; and a dowel H which is displaced by the motor F and causes the change lever E to be displaced. When the motor F rotates, the output member G and dowel H move from the unlocking state to the locking state, thereby causing both the locking levers A and C to be displaced to the locking state. When the motor F further rotates for locking, only the dowel H is independently displaced to the antitheft position, thereby causing the connector D to move to the antitheft position, and the linkage of both the locking levers A and C is cancelled. In this antitheft state, even though the sub locking lever C is caused to turn by the locking button B, the locking device will not be able to be turned into the unlocking state.

The first problem of the above known device exists in the displacement of the dowel H from the unlocking position to the antitheft position via the locking position. As the locking position is between the unlocking position and the antitheft position, the output member G and dowel H must be caused to stop at the locking position without fail and must not move further beyond the locking position when the locking device is changed over to the locking state by the motor F. For this reason, the above known device is provided, in the

vicinity of the output member G, with a switch I which is able to stop the motor F by detecting that the output member G enters the locking position. Actually however, as it is impossible to detect the locking position of the output member G if the switch I should be out of order, the motor F will continuously rotate until the dowel H reaches the antitheft position. In other words, if the switch I is out of order, it will be impossible to change over to the locking state with the motor F. And as the dowel H moves farther by only the distance between the locking position and the antitheft position than the output member G moves, it is necessary to make the motor casing larger to match the distance therebetween.

Furthermore, the second problem of the already known device exists in the configuration by which the connector D is reset from the antitheft position to the normal position. The printed specification of USP 4,978,154 is lacking in the description in relation to the problem, and the applicant's understanding of this point is not sufficient. It seems that, even though the key cylinder is caused to turn to unlock in a case where the motor F is out of order in the antitheft position, it is impossible for the connector D to be reset to the normal position. Namely, when the key cylinder is caused to turn to unlock, the main lock lever A moves to the unlocking position. However, at this time, as the output member G moves alone to the unlocking position with the dowel H left, the connector D remains at the

antitheft position and does not move. As a result, the function of the locking button 3 will be lost.

It is therefore an object of the invention to provide, with simple configuration, a door locking device with an antitheft mechanism, which can readily be switched to and from the antitheft state.

In accordance with one aspect of the invention a door locking device includes an antitheft mechanism for disabling an internal unlocking member and which is arranged to be placed in the antitheft state by a further operation of an output member, a preceeding operation of which changes the locking device from an unlocked state to a normally locked state that is releasable by the internal unlocking member.

According to another aspect of the invention a door locking device includes an antitheft mechanism for disabling an internal unlocking member and which is arranged to be restored from an antitheft state to re-enable the internal unlocking member, upon actuation of a further unlocking member to restore the door locking device from a locked to an unlocked condition.

It is a preferred object of the invention to provide a small-sized and highly versatile actuator unit with an antitheft mechanism, by integrally incorporating an antitheft mechanism in an actuator unit casing.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompaning drawings wherein:

Fig. 1 is an arrangement view of a group of levers in the locked state,

Fig. 2 is an arrangement view of a group of levers in the unlocked state,

Fig. 3 is a rear elevational view of the lock unit,

Fig. 4 is a rear elevational view showing a reduction gears mechanism of the actuator unit,

Fig. 5 is a front elevational view of a lock body,

Fig. 6 is a partially notched sectional view of the actuator unit,

Fig. 7 is a view showing the main lock lever,

Fig. 8 is a view showing a lock link,

Fig. 9 is a view showing a turning lever,

Fig. 10 is a view showing a link,

Fig. 11 is a view showing a changeover body,

Fig. 12 is a view showing a connector,

Fig. 13 is a view showing an intermediate lever,

Fig. 14 is an arrangement view of a group of levers in the unlocked state,

Fig. 15 is a view showing the state where the turning lever is turned into the locking state from the state shown in Fig. 14,

Fig. 16 is an arrangement view of a group of levers in the locked state,

Fig. 17 is a view showing the state that the turning lever is in contact with the changeover body with the turning lever turned to lock from the state shown in Fig. 16,

Fig. 18 is a view showing the state where the connector has moved to the antitheft position,

Fig. 19 is an arrangement view of a group of levers in the antitheft state,

Fig. 20 is a view showing the state where the intermediate lever is caused to turn to unlock by the inside lock button in the antitheft state,

Fig. 21 and Fig. 22 are views showing the on-the-way states of the antitheft state, and

Fig. 23 is a view showing an example already known to the public.

A preferred embodiment of the invention will be described with reference to the drawings attached hereto. A locking device according to the invention has a lock unit 1 and an actuator unit 2 attached to the lower part of the lock unit. As shown in Fig. 5, a latch 83 engageable with a striker 81 fixed at the vehicle body and a ratchet 83 engageable with the latch 82 and to retain the engagement of the latch 82 with the striker 81 are accommodated at the front side of the lock body 80 of the lock unit 1. The ratchet 83 has a ratchet pin 22 which protrudes to the rear side of the body 80 via a through hole 84 of the body 80.

As illustrated in Figs. 1 and 2, an opening lever 3 is pivotally fixed at an axis 4 at the rear side of the lock unit 1. A long slot 5 is formed at the left end side of the opening lever 3, and the edge portion of a rod 7 extending to an opening handle 6 installed outside the vehicle door is

engaged with the long slot 5. An engaging portion 8 is formed at the right end of the opening lever 3, and an inner lever 10 which turns by the opening handle 9 installed inside the door is faced to the engaging portion 8.

The main lock lever 11 is pivotally fixed at an axis 12 downwards of the opening lever 3 at the rear side of the body 1, and an arcuate slot 13 is formed, centering around the axis 12, at the left end of the lock lever 11. The end portion of the rod 15 extending to the key cylinder of the door is engaged with the arcuate slot 13. An arm 16 extending downwards is formed at the right side of the main lock lever 11, and one end of the connector 17 is linked with the leading edge of the arm 16, using a pin 18. The connector 17 is installed roughly horizontally, and the lower end of the longitudinal lock link 19 is linked with the left end thereof by a pin 20. The upper end of the link 19 is pivotally fixed at the opening lever 3 by a pin 21.

The main lock lever 11 is, as already known, changed over to the locking position shown in Fig. 1 and to the unlocking position shown in Fig. 2. The lock link 19 is displaced in interlocking with the changeover of the main lock lever 11. In the unlocked state, when the link 19 is moved downwards by the turning of the opening lever 3, an engaging piece 23 of the link 19 is engaged with the ratchet pin 22 to cause the ratchet 83 to be turned. Therefore, it is possible to open the door. But in the locked state, even though the link is moved downwards, the engaging piece 23 is

apart from the ratchet pin 22 and can not be engaged therewith, the door is not opened.

As illustrated in Fig. 3, a sheet metal back plate 24 which covers roughly the entirety of the rear side is provided at the rear side of the body 80. A plurality of holes 28 are formed in a synthetic resin casing 27 of the actuator unit 2, and the holes 28 are, respectively, matched with a plurality of holes 29 formed at the back plate 24. Then, screws (not illustrated) are made to pass through these holes in order to fix the casing 27 on the plate 24.

As shown in Figs. 1 and 2, the casing 27 is shown with hypothetical lines, and the inner components thereof are shown with solid lines. Two axes protrude outwards from the casing 27. One of the axes is, as shown in Fig. 6, an output axis cylinder 31 which is mounted like double axes relative to an axis 47. The output axis cylinder 31 protrudes rearwards of the casing 27. Furthermore, in Fig. 6, the axis 47 also protrudes outwards of the casing 27 in order to secure the strength to support the output axis cylinder 31. The other axis thereof is a support axis 35 attached in parallel to the axis 47, and the support axis 35 protrudes frontward of the casing 27.

An output arm 25 is fixed at the protruding end of the output axis cylinder 31, and a pin 33 formed at the main lock lever 11 is engaged with a slot 34 of the output arm 25, thereby causing the output axis cylinder 31 and the main lock lever 11 to rotate in interlock with each other. The sub

lock lever 26 is fixed at the protruding end of the support axis 35 and is linked via a rod 37 with a lock button or lever 36 provided inside the door.

In Fig. 4, an electric motor 38 is mounted inside the casing 27, and a gear 40 is fixed at an axis 39 of the motor 38. A large diametered gear 41 is caused to engage with the gear 40, and a small diametered gear 43 is attached to a rotating axis 42 of the gear 41. Then, the gear 43 is caused to engage with the gear portion 45 formed at the outer circumferential portion of the sector-like output member 44. Although not illustrated, it is preferable that the gear 43 is attached via a known clutch mechanism to the rotating axis 42. The clutch mechanism is such that the force of the rotating axis 42 is transmitted to the gear 43 but the force of the gear 43 is not transmitted to the rotating axis 42. The base 46 of the output member 44 is fixed at the center axis 47. A rubber stopper 85 brings into contact with the output member 44 when the output member 44 turns to the locking position.

Although omitted in Fig. 4, the components shown in Fig. 9 to Fig. 13 are attached in the casing 27. These components are assembled as shown in Fig. 14. The center axis 47 is inserted through the axis hole 49 of the rotating lever 48 and fixed therein. For this reason, as the output member 44 is rotated by the motor 38, the rotating lever 48 also rotates via of the axis 47. Furthermore, as the output axis cylinder 31 rotatably encloses the axis 47, the axis

cylinder 31 does not directly rotate even though the axis 47 rotates.

A link 50 is provided so as to be piled together with an intermediate lever 48. The link 50 has an axis hole 51 fixed on the output axis cylinder 31 (Refer to Fig. 6). An arcuate hole 52 centering around the axis hole 49 is formed at the rotating lever 48, and a projection 53 formed on the link 52 is linked with the arcuate hole 52 with motion lost. A spring 54 is placed between the link 50 and the rotating lever 48, thereby causing the rotating lever 48 to be energy-charged counterclockwise due to elasticity of the spring 54. Therefore, when the motor 38 is caused to turn off, the rotating lever 48 is maintained in such a state that the left end 55 of the arcuate hole 52 is in contact with the projection 53. The link 50 rotates by engagement of the arcuate hole 52 with the projection 53 as the rotating lever 48 is rotated by the motor 38. Accordingly, the link 50 causes the main lock lever 11 to rotate via the output axis cylinder 31.

An intermediate lever 56 is fixed at the support axis 35 attached in parallel to the center axis 47. As shown in Fig. 13, a roughly inversed L shaped hole 57 is formed at the intermediate axis 56, and a pin 60 formed at the right end 59 of a laterally long connector 58 is engaged with the inversed L-shaped hole 57. Another pin 69 is provided at the left end 68 of the connector 58. And the pin 69 is inserted through an axis hole 70 which is formed at the link 50. The roughly

inversed L-shaped hole 57 comprises a changeover opening 61 extending radially relative to the support axis 35 and an arcuate wide swing opening 62 centering around the support axis 35. The pin 60 is usually maintained in such a state that it is engaged with the outer end 64 of the changeover hole 61 due to actions of a perturbation spring 63. Under this condition, the link 50 is linked with the intermediate lever 56 via the connector 58.

Fig. 2 and Fig. 14 show the unlocked state. In the unlocked state, as the inside lock button 36 is manually turned into the locking side, the sub locking lever 26 and the intermediate lever 56 rotate clockwise together, thereby the connector 58 moves left to cause the link 50 to rotate clockwise. As the link 50 is linked with the output arm 25 via the output axis cylinder 31, the output arm 25 rotates clockwise to cause the main locking lever 11 to be changed over to the locking position (Fig.1, Fig. 16). Furthermore, as the link 50 rotates clockwise in Fig. 14, the projection 53 of the link 50 is brought into collision with the left end 55 of the arcuate hole 52 to cause the rotating lever 48 to rotate clockwise. However, as a clutch mechanism is provided between the rotating lever 48 and the motor 38, the motor 38 does not rotate. Besides, in Fig. 2, when the main locking lever 11 is changed over to the locking position, the inside lock button 36 is changed to the locking position due to the

opposite procedure thereof.

An axis hole 72 of a change member 71 is rotatably inserted into the pin 69. The change member 71 acts to change the antitheft mechanism to the antitheft state. The antitheft state according to the invention can be accomplished by shifting the pin 60 of the connector 58 from the outer end 64 of the change opening 61 to the inner end 65 thereof against the elasticity of the spring 63 in the locked state shown in Fig. 16. Furthermore, the state where the pin 60 is engaged with the outer end 64 thereof is expressed as a normal state in the invention.

The change member 71 is always energy-charged in the left rotation direction due to actions of a spring 73, and the folding piece 74 of the change member 71 is in contact with the connector 58. The change member 71 has a cam face 75 at the circumferential portion thereof and a wall 76 formed at the end portion of the cam face 75. In the unlocked state shown in Fig. 14, the cam face 75 is piled up together with the rotation locus of the engaging piece 77 of the rotating lever 48. However, the wall 76 is out of the rotation locus of the engaging piece 77. Therefore, in the unlocked state, as the rotating lever 48 is rotated clockwise (in the locking direction) by the motor 38, the engaging piece 77 of the rotating lever 48 comes in contact with the cam face 75 to cause the change member 71 to rotate against the elasticity of the spring 73. Furthermore, as the rotating lever 48 rotates, the right end of the arcuate hole

52 is engaged with the projection 53 to cause the link 50 to rotate clockwise. The main locking lever 11 is changed over to the locking position by the rotation of the link 50, and the connector 58 moves leftwards and is turned into the state shown in Fig. 15. Hereupon, as the connector is turned into the state shown in Fig. 15, the output member 44 comes in contact with the stopper 85 to cause the rotation of the motor 38 to stop. Under this condition, in a case where the electric current to the motor 38 is interrupted, the rotating lever 48 is turned counterclockwise by the elasticity of the spring 54. Hereupon, even though the rotating lever 48 turns, the link 50 does not turn due to lost motion formed by the hole 52 and projection 53. The change member 71 which is released from the rotating lever 48 is restored as it was, by the elasticity of the spring 73, and the folding piece 74 comes in touch with the connector 58. This state is the locked state shown in Fig. 16.

Although the wall 76 of the change member 71 is out of the rotating locus while being unlocked (in Fig. 16), the wall 76 is piled up together with the rotating locus of the engaging piece 77 while being locked. Therefore, as the rotating lever 48 is turned clockwise by the motor 38 while being locked, the engaging piece 77 is brought into contact with the wall 76 as shown in Fig. 17 to cause the change member 71 to be turned counterclockwise. Then, the folding piece 74 of the change member 71 causes the connector 58 to rotate centering around the pin 69. Therefore, the pin 60 is

displaced from the outer end 64 of the change member 61 to the inner end 65 thereof as shown in Fig. 18. As the pin 60 is positioned at the inner end 65 thereof, the antitheft mechanism is turned into the antitheft state. Thereafter, even though the intermediate lever 56 is turned counterclockwise by the inside lock button 36, it is impossible to shift the pin 60 with the actions of the wide swing opening 62. So, the changeover of the main lock lever 11 is impossible. Furthermore, Fig. 19 shows the state that the rotating lever 48 is returned with the elasticity of the spring 54 with the current supply to the motor interrupted.

A guide plate 67 to cancel the antitheft function is integrally formed with the casing 27. As the link 50 is turned counterclockwise in the state shown in Fig. 19 to cause the connector 58 to move rightward, the guide wall 67 is brought into contact with the right end of the connector 58 to cause the connector to turn clockwise. Thereby, the pin 60 of the connector 58 is displaced to the outer end 64 of the change member. A stopper 66 is formed integrally together with the casing 27. The stopper 66 is brought into contact therewith when the intermediate lever 56 is turned into the unlocked state. Hereupon, 79 is a switch to detect the super-lock position of the connector 58 when it is turned to this position.

Changing Operation to The Locking State

In a case where a key cylinder 14 is turned to lock in

the unlocked state (Fig. 2, Fig. 14), the main locking lever 11 is turned counterclockwise via a rod 15 to cause the connector 17 to move rightward. Thereby, a link 19 is displaced rightward centering around a pin 21, and a contacting piece 23 of the link 19 is separated from the ratchet pin 22 of the ratchet 83 and is turned into the locked state. At this time, as the output arm 25 is engaged with the main locking lever 11, the link 50 turns clockwise by the output axis cylinder 31 via the output arm 25. Thus, the intermediate lever 56 turns, as shown in Fig. 16, by engagement of the pin 60 with the change hole 61 and by the rotation of the intermediate lever 56 the sub locking lever 26 and inside lock button 36 are displaced toward the locking position.

Hereupon, the projection 53 is engaged with the left end 55 of the hole 52 by the rotation of the link 50. Even though the rotating lever 48 and output member 44 are caused to turn, the motor 38 does not rotate due to actions of the clutch mechanism.

Furthermore, in the case of being changed to the locked state by the inside lock button 36, the intermediate lever 56 is caused to turn via the sub locking lever 26 by the button 36 to make the connector 58 move leftward. Hereupon, the link 50, output axis cylinder 31 and output arm 25 integrally turn clockwise to cause the main locking lever 11 to be changed to the locking position (Refer to Figs. 1 and 16).

Furthermore, in a case of being changed to the locked

state by the motor 38, the output member 44 is turned via a group of reduction gears. Then, the center axis 47 and rotating lever 48 integrally turn clockwise in Fig. 14, the engaging piece 77 of the rotating lever 48 is brought into contact with the cam face 75 of the change member 77, and the change member 77 is caused to turn clockwise against the elasticity of the spring 73. Furthermore, as the rotating lever 48 turns clockwise, the right end 78 of the arcuate hole 52 contacts the projection 53 to cause the link 50 to turn clockwise. Thereby, the output axis cylinder 31 and output arm 25 integrally turn to cause the main locking lever 11 to be displaced to the locking position. And as the connector 58 moves leftward due to the rotation of the link 50, the intermediate lever 56 turns clockwise and is turned into the state shown in Fig. 15. In the state shown in Fig. 15, both the sub locking lever 26 and inside lock button 36 are integrally displaced to the locking position.

Hereupon, in the locked state, the output member 44 comes in contact with the stopper 85 and the motor 38 stops. As the motor 38 comes to a stop, the current supply to the motor 38 is interrupted. Then, the rotating lever 48 turns counterclockwise by the elasticity of the spring 54 until the left end 55 of the arcuate 52 comes in touch with the projection 53, thereby causing the change member 71 to turn counterclockwise due to the elasticity of another spring 73. Then, the state shown in Fig. 16 is reached. A timer to measure the time duration to permit electric current to flow

to the motor 38 or a switch to detect the locked state is used in order to interrupt the electric current to the motor 38. In the case of the present invention, even though the switch is damaged, the output member 44 can be only rotated to the locking position. Therefore, the changeover to the locked state can be carried out as usual.

Changing Operation to The Antitheft State

When being changed to the antitheft state, the lock unit is changed to the locked state (Fig. 1, Fig. 16) by either of the methods described above. In the locked state, the motor 38 is given electric current to cause the output member 44 and rotating lever 48 to rotate clockwise. Then, as shown in Fig. 17, the engaging piece 77 of the rotating lever 48 is engaged with the wall 76 of the change member 71 to cause change member 71 to turn counterclockwise centering around the pin 69. Thereby, the folding piece 74 of the change member 71 causes the connector 58 to turn counterclockwise centering around the pin 69. Then, the pin 60 of the connector 58 is displaced from the outer end 64 of the change hole 61 to the inner end 65 thereof and is turned into the antitheft state shown in Fig. 18.

In the antitheft state, as the output member 44 is brought into contact with the stopper 85, the motor 38 comes to a stop. After the motor 38 stops, the electric current to the motor 38 is interrupted, and the rotating lever 48 is turned counterclockwise by the elasticity of the spring 54

until the left end 55 of the arcuate hole 52 comes in touch with the projection 53 (Fig. 19).

In this antitheft state, even though the intermediate lever 56 is turned counterclockwise by operating the inside lock button 36 to the unlocking side, the pin 60 of the connector 58 will not move due to actions of the wide swing opening 62. Therefore, even though the lock button 36 is directly operated with the window broken, the locking state will not be cancelled, and the door can not be opened.

Thus, with the present invention, the antitheft state is obtainable by rotating the motor 38 for the purpose of locking.

Cancelling The Antitheft State

In order to cancel the antitheft state shown in Fig. 19, the link 50 is turned counterclockwise by the motor 38 or the key cylinder 14. Then, the connector 58 moves rightward, the right end 59 thereof is brought into contact with the guide wall 67 (Refer to Fig. 21), and the connector 58 is gradually turned clockwise by the guide wall 67 as the connector 58 moves rightward. Then, the state is turned into the state shown in Fig. 14 via the state shown in Fig. 22. Accordingly, the connector 58 is returned to the normal state, and at the same time, the main locking lever 11 is turned into the unlocked state.

CLAIMS:

1. A door locking device with an antitheft mechanism comprising:

a lock unit attached to the door, the lock unit having:

a latch engageable with a striker fixed to the vehicle body;

a ratchet in engagement with the latch to maintain the engagement of the latch and the striker;

an open lever which is connected to an open handle of the door and releases the ratchet from the engagement with the latch; and

a main locking lever which is linked with a key cylinder of the door and is able to be changed a locking position and an unlocking position, disables the release of the ratchet by the open lever at the locking position;

an actuator unit attached to the lock unit, the actuator unit having:

a roughly enclosed casing which accommodates a first axis, a second axis positioned in parallel to the first axis, and an antitheft mechanism which is provided between the first axis and the second axis and is changed over to the antitheft state where the rotation of the second axis is not

transmitted to the first axis and the normal state where the first and the second axes are linked with each other;

one end of the first axis protruding outwards the casing and being linked with the main locking lever;

one end of the second axis protruding outwards the casing;

a sub locking linked with an inside lock button of the door and fixed at one end of the second axis;

a motor having an action to rotate the first axis and another action to change over the antitheft mechanism and accommodated in the casing.

2. A door locking device with an antitheft mechanism defined in claim 1, further comprising an output member provided between the motor and the first axis, said output member being linked with the first axis with a lost-motion, and a spring which is compressed by rotating the output member for locking by the motor, wherein as soon as the power of the motor is interrupted, the output member is turned to unlock by the distance equivalent to the lost-motion due to the elasticity of the spring.

3. A door locking device with an antitheft mechanism defined in claim 1, further comprising an output member

provided between the motor and the first axis, said output member being linked with the first axis with a lost-motion, and a spring which charges energy to the output member in the unlocking rotation direction, wherein the first axis is turned to lock as the output member is turned to lock by the motor, thereafter as the power of the motor is interrupted, the output member is turned to unlock by the distance equivalent to the lost-motion by the elasticity of the spring, and as the output member is turned to lock by the motor once again the antitheft mechanism is changed to the antitheft state.

4. A door locking device with an antitheft mechanism adapted to operate in such a manner that:

as a motor is caused to turn to unlock by supplying electric current to the motor for unlocking, the locking device is turned into the unlocking state where the door can be opened by the opening handle thereof,

as a motor is caused to is turned to lock by supplying electric current to the motor for locking, the locking device is turned into the locking state where the door can not be opened by the opening handle thereof,

the electric current to the motor is interrupted while being in the locking state, and

as the motor is turned to lock by supplying electric current for locking to the motor once again, the antitheft mechanism is turned into the antitheft state where the

locking state can not be changed over to the unlocking state even by operating the inside lock button of the door.

5. A door locking device with an antitheft mechanism defined in claim 4 characterized in that as the motor is rotated for unlocking in the antitheft state, the antitheft mechanism is turned into the normal state thereof and the locking device is also turned into the unlocking state.

6. A door locking device with an antitheft mechanism comprising:

a main locking lever connected to a key cylinder of the door and for changing over the locking device to a locking state or to an unlocking state;

a sub locking lever connected to an inside lock button of the door;

a connector provided between the main locking lever and the sub locking lever, always linked with the main locking lever and changed over to a normal position where it is linked with the sub locking lever and to an antitheft position where it is not linked therewith;

an output member which is turned by the motor and is linked with the main locking lever; and

a guide wall provided in the vicinity of the connector, the guide wall being engageable with the connector as the connector is displaced by unlocking rotation of the main

locking lever, in order to displace the connector from the antitheft position to the normal position.

7. A door locking device with an antitheft mechanism defined in claim 6 further comprising a change member which is provided between the output member and the connector and displaces the connector to the antitheft position in engagement with the output member as the output member is turned to lock while the locking unit is in the locking state.

8. A door locking device with an antitheft mechanism defined in claim 7 further comprising a lost-motion provided between the output member and the main locking lever and a spring to charge energy to the output member in the unlocking rotation direction, and being characterized in that the output member is not engaged with the change member even though the output member is turned to lock by the motor while the locking device is in the unlocking state, and as the power to the motor is interrupted the output member turns by the distance equivalent to the lost-motion by the elasticity of the spring.

9. A door locking device with an antitheft mechanism comprising:

a main locking lever connected to a key cylinder of the door and for changing over the locking device to a locking

state and an unlocking state;

a sub locking lever connected to an inside lock button of the door;

a connector provided between the main locking lever and the sub locking lever, which is always connected to the main locking lever and is changed over to a normal state where it is connected to the sub locking lever and to an antitheft position where it is not connected therewith;

an output member which is rotated by the motor and is linked with the main lock lever via a lost-motion;

a spring which charges energy to the output member in the unlocking rotation direction; and

which is so arranged that:

as the output member is turned to lock by the motor against the spring elasticity, the main locking lever and sub locking lever are displaced to the locking position; and

as the power to the motor is interrupted upon the completion of changing over to the locking state, the output member is turned to unlock by the distance equivalent to the lost-motion by the elasticity of the spring; and

furthermore as the output member is caused to is turned to lock by the motor in the locked state, the connector is displaced to the antitheft position.

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Examiner's report to the Comptroller under Section 17
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Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-3

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Category	Identity of document and relevant passages	Relevant to claim(s)
A	US 4978154 A (KIEKERT) see whole document	1

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